Map Related Projects in General Directorate of Land Registry and Cadastre in Turkey

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Key words: cadastre, e-governance, geoinformation, standards.

SUMMARY

Land has an important role for societies every era. Land related information as land registry and cadastre has a great importance in the life, especially while it s known that land is a scarce source too. Therefore General Directorate of Land Registry and Cadastre in Turkey began many land related and map related projects and these have been executed especially from the beginnings of 2000s such as Land Registry and Cadastre Information System, Map Production Following Center, Turkish National Geographic Information System, Archive Information System, Agricultural Reform Implementation Project, Continuously Operating Reference Stations Project, Cadastral Renovation Project.

ÖZET

Her dönemde arazinin toplumlar için önemli bir rolü bulunmuştur. Özellikle arazinin kıt kaynak olarak tanımlandığı günümüzde, tapu ve kadastro gibi araziye dayalı bilgiler, yaşamda büyük bir değere sahiptir. Bu nedenle Türkiye'de Tapu ve Kadastro Genel Müdürlüğü'nde Tapu Ve Kadastro Bilgi Sistemi, Harita Üretim İzleme Merkezi, Ulusal Coğrafi Bilgi Sistemleri, Arşiv Bilgi Sistemi, Tarım Reformu Uygulama Projesi, Sürekli Sabit GPS İstasyonları, Kadastro Yenileme Projesi gibi araziye ve haritaya dayalı pek çok proje başlatılmış ve uygulamaya konulmuştur.

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1. INTRODUCTION

Nowadays land is a social scarcity as land had been known as a wealth at first. In addition to this the societies has changed very fastly through information and technology. In Turkey General Directorate of Land Registry and Cadastre (GDLRC) has main mission on administration of the properties that affect the society life as social, economic and environmental to eliminate the negativeness about land tenure (ownership, use, etc), to assistant for use of national resources conveniently, to produce ownership information fastly and accurately, to manage and update all these data. GDLRC has been trying to work with a harmonious environment to this information and technology era. Therefore GDLRC which is one of the leader institutions has executed many coordinated projects such as Land Registry and Cadastre Information System, Map Production Following Center, Turkish National Geographic Information System, Archive Information System, Agricultural Reform Implementation Project, Continuously Operating Reference Stations Project, Cadastral Renovation Project.

In this paper, all the projects will not be explained at length because of the limited opportunities. Mainly Map Production Following Center, the subproject of Land Registry and Cadastre Information System (LRCIS), and Continuously Operating Reference Stations Project (CORS) will be taken part here.

LAND REGISTRY AND CADASTRE INFORMATION SYSTEM PROJECT (LRCISP) and MAP PRODUCTION FOLLOWING CENTER

LRCISP has a big importance about ownership rights which is one of the main components of e-Transformation. First phases of this project are put into practice as a mean of pilot project and executed with successfully. It is a considerable e-government and GIS project in Turkey. In future it is aimed to share related information with other related institutions (Municipalities, Local Administrations, Ministry of Forest, Ministry of Transportation, Ministry of Agriculture, Ministry of Energy, ..etc.) and to transform into Multipurpose Land Information System. Also LRCISP is mentioned in National Program about Pre-Accession to European Union as “medium-term project” with its ownership-based legal and updated information to be used in one-center by all institutions.

LRCISP Agreement was signed by HAVELSAN A.Ş. that is a Turkish Armed Forces Foundation and came into force on 26 December 2000. Until 19 June 2001 the organization of the GDLRC, study methods, study sources, current laws were examined; the documents of the processes of land registry, cadastre, administrative and financial were fixed. The analysis was

completed on 26 December 2000. The Project Design was materialized between 01 May 2001 and 23 October 2001. The software process began.

The software development process was completed on 20 June 2002 and the softwares were begun to install into real environments. The digitized data were integrated into LRCIS and test studies began to be applied. The first phase of the project that will become widespread in 81 cities with theirs 1003 Land Registry Offices and 327 Cadastre Offices began in Çankaya in Ankara on 16 December 2002 and in Gölbaşı in Ankara on 06 January 2003 as pilot studies. (Figure 1).

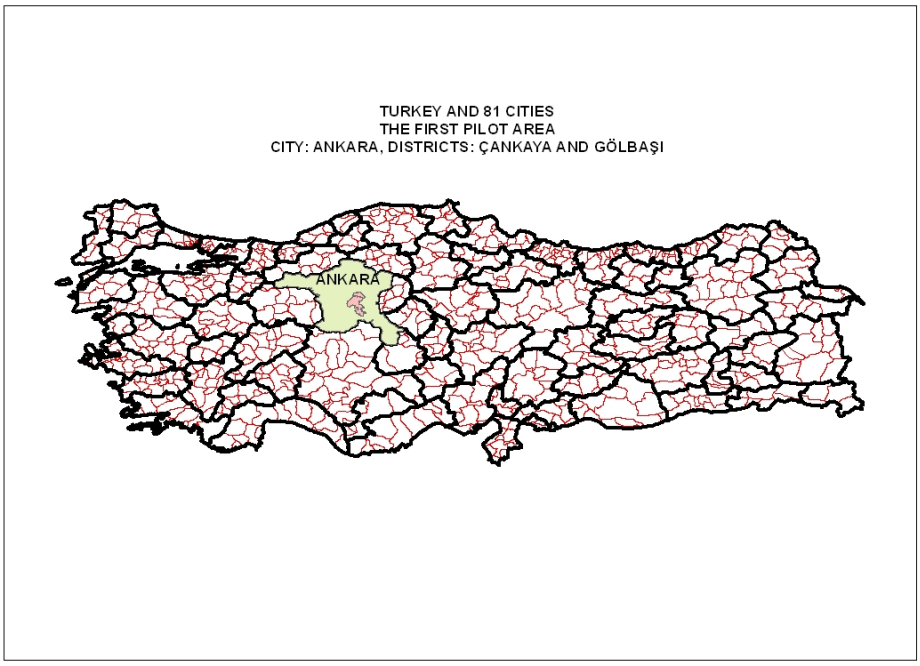

Figure 1: The First Pilot Area (Çankaya and Gölbaşı) in Turkey with 81 cities.

The pilot project was completed in districts of Çankaya and Gölbaşı. Now the studies had started on 22.07.2005 to extend the second phase of LRCISP to whole country initially with 225 land registry and cadastre offices.

In the second phase of LRCISP nine (9) different but coordinated projects have been continued. One of these important projects is Map Production Following Center.

2 Map Production Following Center (MPFC)

Map Production Following Center named as Map Information Bank Project (MIBP) has the characteristic to be the first metadata project about maps in Turkey. It aims to hold metadata of maps that are produced by map related institutions. It is a kşnd of a catalog system, information system.

The goals of this project is to prevent duplicate data production and duplicate service, to use national resources conveniently, to follow all map related metadata from different map-related institutions in one-center, to generate infrastructure for e-government, to collect big scale spatial data in the concept of Spatial Data Infrastructure (SDI), to provide metadata standardization using TC 211 ISO 19115, to access the real and reliable data in time and fast, to avoid waste of time to search metadata, to provide the needed metadata or data for decision support systems and to supply coordination among institutions, organizations.

The first steps to prevent duplicate production were taken in 1994 with Regulation of Maps and Map Information for Ensuring and Using. Then the concrete legal infrastructure was constituted in "Regulation of Big Scale Maps and Map Information Production (RBSMMIP)" that is become valid on 17 July 2005. This project took the duties from the articles of 103,104 and 105. The mission to follow maps and map information production and to execute these processes in coordination is referred to GDLRC in respect of this regulation. The ministries, institutions, organizations, municipalities have to apply to GDLRC for planning studies and to register the completed projects to GDLRC as a Project Number.

The application is a Geographic Information System (GIS) and ESRI product which is one of the integrated collections of GIS software products for building and deploying a complete GIS.

3 Functions of MPFC

The portal aims to serve users' group on web interface that is still under construction. A few different kinds of functions have been such as entering metadata, searching metadata, managing institutions and users.

Administrative Functions are classified in two parts: Administrative of the institutions and administrative of users. At first all map related institutions are introduced to the system then all the users which have the responsibility to enter metadata are. It is the mandatory step to enter metadata by giving user name and user password, but this step is not needed to search.

The function to register a metadata online has mandatory parts that will be filled: Content of The Metadata, Spatial Boundaries of The Metadata, Information of The Metadata, Owner of The Metadata, and Distributor Institution of The Metadata. This function has TC 211 ISO 19115 standards with its metadata fields (Figure 2).

The function to search metadata has presented two options: Simple Search and Comprehensive Search. Simple Search is used "what" or "where" options are enough to search, in Comprehensive Search some different searching combinations by using institution name, project number, subject words, statue of the project, content of the metadata. After searching, the authorized users have seen "update metadata", "delete metadata", "reject metadata". Addition to that all users have possibility to follow the project area and summary of the metadata information (Figure 3). The metadata searched can be viewed with integration of Google Maps (Figure 4).

However auxiliary functions are inevitable ones. Therefore Usage Guide, Opinions, Frequently Asked Questions are existed on MPFC web page.

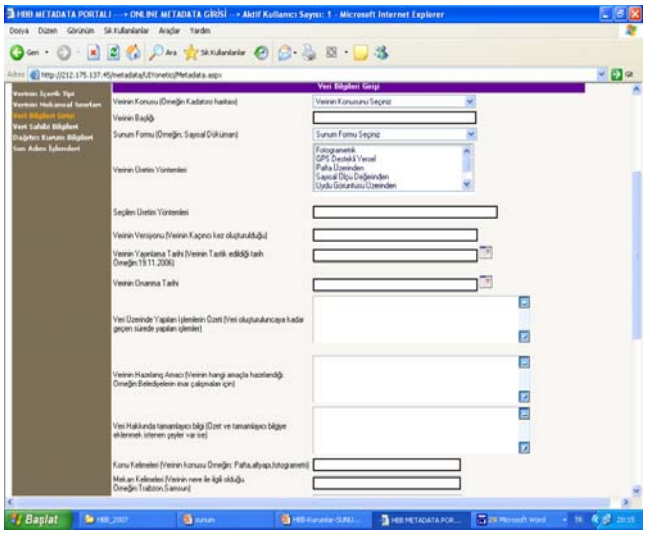

Figure 2: To register metadata online by using ISO 19115

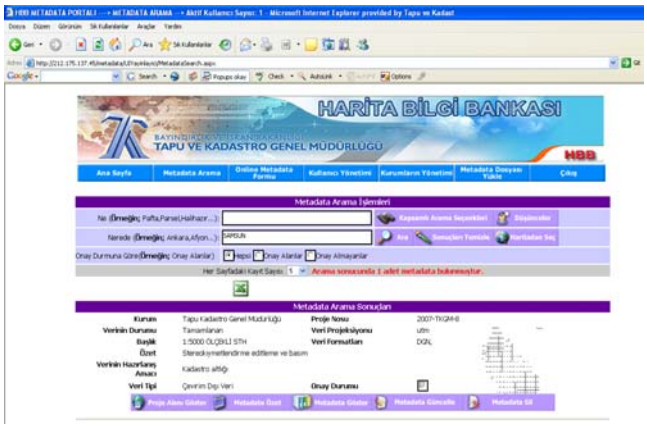

Figure 3: Searching Metadata.

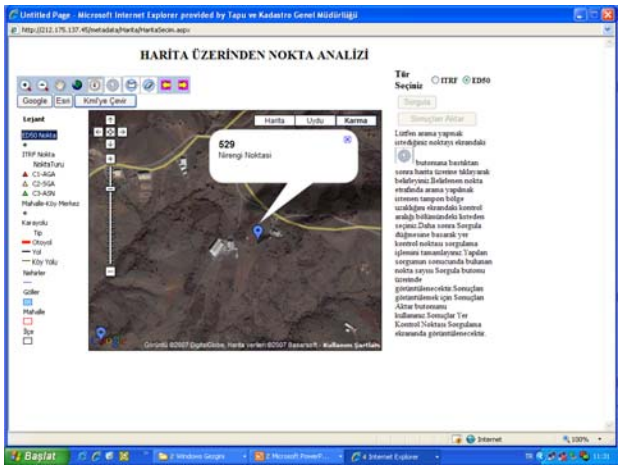

Figure 4: Integration of Google Maps.

3. CONTINUOUSLY OPERATING REFERENCE STATIONS PROJECT

3.1 Tubitak R&D Projects Of Public Establishments (Code 1007)

Turkish Scientific and Technical Researh Agency, within the frame of its self-defined mission "To play a pioneer role in developing the policies of science and technology, in contributing to the formation of infrastructure and tools that will realize these policies, in supporting and carrying out the activities of research and development and in constituting the culture of science and technology, in order to increase the competitiveness and comfort of our country and keep them lasting; in cooperation with all fractions of the society and relevant establishments; and in parallel with our national priorities", has initiated a new program on March 10, 2005, per the decision of the High Counsel of Science and Technology, in order to support projects that contribute to the resolution of problems with the help of research activities conducted by public establishments.

In abstract, the basic target of code-1007 program has been defined as supporting projects that can contribute to meeting necessities that may be removed, and to resolving problems with the R&D works of public establishments.

3.2 CORS-TR (Continuously Operating Reference Stations) Project

Public establishments have speeded up their R&D activities in accordance with the aforementioned program. Within the scope of this program, Istanbul Culture University (ICU), jointly with the General Command of Mapping (GCM) and the General Directorate of Land Registry and Cadastre (GDLRC), has proposed to TÜBİTAK an extremely crucial project for Turkey. TÜBİTAK, and upon scientific assessment, has decided to support this nation-wide "Project of Research and Implementation Related to the Establishment of Networkbased Stationary Real-Time Kinematic (RTK) GPS Terminals and Determination of Cellular Transformation Parameters". The project's agreement was signed on April 18, 2006 by TÜBİTAK, ICU, GCM and GDLRC, and shall be concluded on April 18, 2008 (Figure). This project shall be abbreviated hereafter as CORS-TR Project.

CORS-TR Project will be a pioneer application in our country, keeping in mind its research and development nature towards the formation of nation-wide engineering infrastructure, being carried out with the cooperation of TÜBİTAK, a University and two distinguished mapping establishments serving in the same sector.

3.3 CORS-TR Project's Goal

Geographic data plays an extremely crucial role in all kinds of spatial design, planning and applications, hand to hand with efficient usage of resources, in all organized societies. Cadastre and mapping works necessitate the usage of up-to-date geographic bases in order to manage and conduct all kinds of spatial works including structural and infrastructural ones.

The rapid technological and scientific developments during recent years have enabled the digital storage of geographic data and the integration of relevant attribute data in computer environment. Geographical / Land Information Systems (GIS / LIS) evolved from the ability to evaluate and manipulate graphic and attribute data from within the computer environment. Nowadays, GIS / LIS became inseparable part of our life. Geo-information has a lot of uses. For instance, administration of state, forest, environment, and city planning, determination of land usage and agricultural policy, engineering structuring, evaluation of infrastructure and natural resources, multi-purpose cadastre, e-government, e-municipality, e-commerce, and all other activities that depend on spatial information, are just few examples.

It is a must to determine the position (i.e. coordinates) using trustworthy methods, as it is the base in cadastre, mapping and GIS / LIS. Otherwise, problems of inconsistency and poor integration would be faced. The technology of Global Positioning System (GPS) has opened a new era regarding the determination of positions. Despite the fact that GPS technology has entered our country in 1990's, public and private establishments are still using uneconomical old-fashion methods and techniques. That is where CORS-TR Project comes into the picture; targeting the substitution of old inefficient systems with a single, fast, efficient, economical, trustworthy and modern system that can serve nation-wide. Furthermore, this project will serve to determine the transformation parameters from old national datum of ED50 to current datum of ITRFyy, and to migrate all old data in ED50 into ITRFyy. As a result, each point will have one uniform and unique address (i.e. coordinates).

The main goals of this project that will establish CORS-TR stations functioning 24 hours / day and, thus, enable the determination of datum transformation parameters are:

- Acquiring accurate positional data, necessary for the production of geographic data and documents to serve the higher purposes of country defense and
- development, using CORS-TR methodology in a much faster, more economical and correct manner,
- Providing trustworthy positioning service for all kinds of navigation, vehicle tracking and transportation activities,
- Resolution of related basic problem faced by all establishments that deal with production of maps and map data, such as GCM and GDLRC, upon

- determination of cellular transformation parameters, thus ensuring the migration of existing cadastral measurements and maps in analogue format,
- that had been produced by classical methods, to current datum and TAKBIS project,
- Realization of highly accurate real-time monitoring system of plate tectonics in our earthquake-active country, thus enabling continuous measurements of deformation magnitudes and directions,
- Modeling the ionosphere and troposphere in the region of Turkey, thus enabling better meteorological predictions and providing enhanced capability
- and tool for various scientific research, such as in the fields of signal and communication,
- Providing fast response to establishments involved in the production of map and map data, such as GDLRC and GCM, regarding their activities of
  - Geodetic point construction (leveling, polygon. etc.), measurement and computation;
  - Terrestrial map and cadastral measurements;
  - TAKBIS data transformation and new data collection; and other terrestrial measurements for GIS/LIS applications.

Such necessities will be met rapidly, economically and well with this project.
For the sake of achievement of CORS-TR Project's goals, the whole area of Turkey has been selected as Project Area, as this project from scope to content will open a new era in mapping and IT in our country, and will provide great facility regarding the usage of hightech tools thereafter.

In summary; the aim of this project is fast, correct, and trustworthy collection of all kinds of geography-based field and field-related data, thus, speeding up the activities of cadastre, assuring organized urbanization, constituting the spatial infrastructure for relevant works of e-government, and monitoring plate tectonics. When the project concludes, we will have the ability to acquire coordinate information with cm-accuracy, any place and any time nation-wide, using a methodology regarded as highly economical when compared to classical ones, with 1 to 2-minute intervals.

3.4 Scope of Project

Within the scope of this project: stationary GPS stations will be established to serve the whole country, operating with Real-Time Kinematic (RTK) functionality, based on the network concept, and the capability to transform from ED50 datum to ITRFyy datum will be provided. Thus;

- Real-time usage of the system will be possible;
- All users will be able to get service from the centers to be established;
- Service will be provided nation-wide;
- Basis of all geo-information technologies will be constituted; and
- The relationships between ED50 and ITRFyy datums will be provided.

In brief, CORS-TR Project will remove the necessity of ground construction in the field of mapping in our country to great extent; will provide the users with high-tech's convenience and products.

Currently, there exist more than 2000 GPS receivers in the entire country. These GPS users, benefiting from static or RTK (real-time) techniques, are forming their own base stations, and then computing coordinates with the use of rover receivers. In static measurements, depending on the baseline length and applied method, rovers are required to collect data for periods extending from 15 minutes to multiple hours. When using RTK, on the other hand, solution can be acquired up to 5-10 km from the base station (Figure 5).

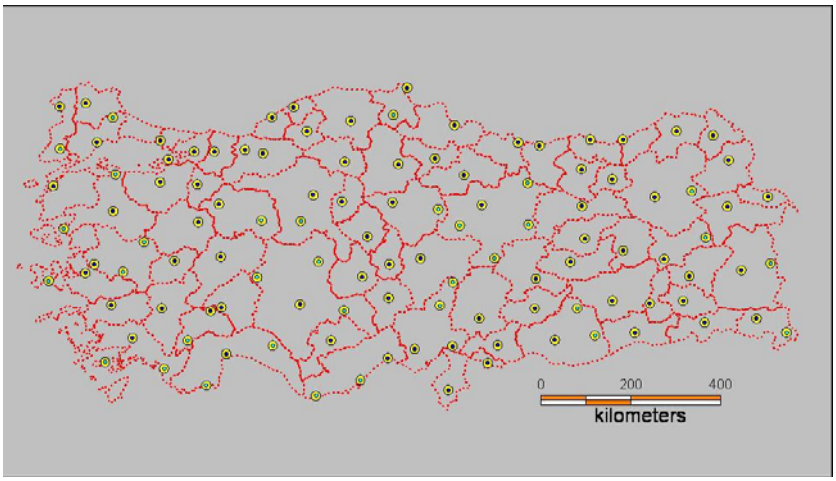

Figure 5: Classical RTK coverage (10 km radius)

The points determined as a result of this troublesome and expensive approach are marked in the field with stones of different dimensions (including pillars). This project will provide the existing and new GPS receivers with the capability to determine coordinates faster, more economical and more accurate that before, thus increasing their efficiency largely. The CORS-TR Network approach will provide the capability to determine static and RTK positions with 1-2 minute intervals, if not down to mere seconds. When using RTK, solution will be provided up to 75 km away from the base station (Figure 6). Points determined with such easy and economical approach can be marked in the field with practical and cheap materials.

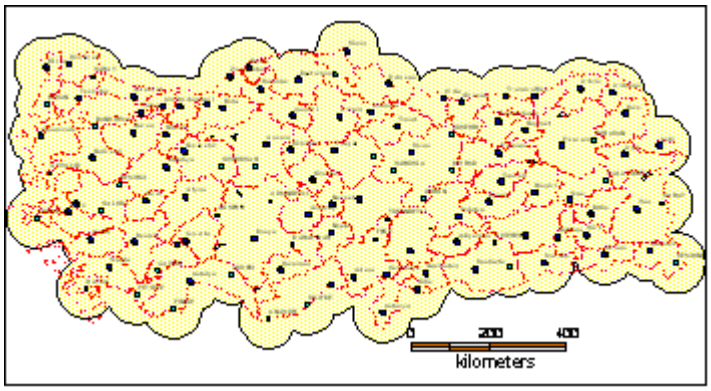

Figure 6: CORS-TR Coverage (75 km radius)

The fundamental 4 activities to be conducted in the project can be outlined as follows:

- CORS-TR System Design (Station Location, Software/Hardware...etc.);
- CORS-TR System Installation and Execution;
- Improvement of Datum Transformation Models; and
- Research and Developments.

The target here is to establish one station in each province, in order to provide a system that will cover the whole country, functioning 24 hours / day, and able to provide the capability of accurate position determination (Figure 6). Thus, with the assistance of this system:

- It will not be necessary to search for leveling benchmarks nor polygons for geodetic measurements or activities of mapping and cadastre;
- For GPS measurements, the necessity for further reference/base stations will be removed, and instead of the current status of having 1-2 bases and few rovers, we will have 1 reference station and tens even hundreds of rovers usable simultaneously; and coordinates will be produced with a single national format and standard.

Each reference station within CORS-TR system will hold the characteristics of CORS Network and will provide the capability of cm-level real-time positioning within its own "jurisdiction" area. The system, at the same time, will be web-based and will assist the users with data post-processing. The CORS-TR system will be integrated into Turkey's National GPS Network (TNGN, known as Turkiye Ulusal Temel GPS Agi – TUTGA in Turkish) that has been established by GDLRC and GCM within ITRFyy datum.

The works that will be carried out within the scope of CORS-TR are briefly as follows:

3.5 CORS-TR System Design (Location, Software/Hardware...etc.)

CORS-TR system design (Figure 7).
:

- Determination of station locations;
- Determination of GPS receivers of CORS Network;
- Determination of software packages of CORS Network;
- Determination of CORS control center; and

Determination of the requirements of communication and power (electricity, phone, internet...etc).

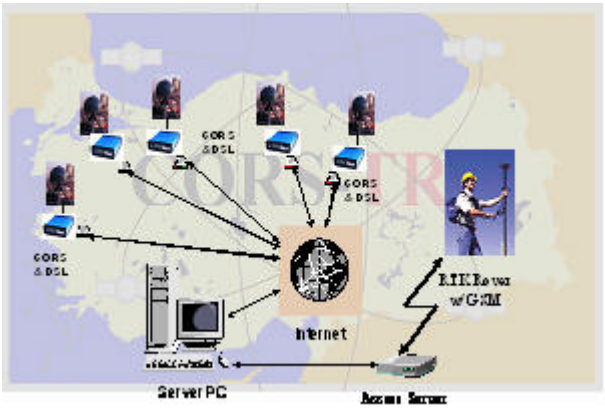

Figure 7: CORS-TR System Design

With CORS-TR it is targeted to enable all users all over Turkey to determine positions through RTK. Within CORS-TR Network the coverage of RTK is anticipated to be at most 75 km from the nearest station. Thus, the spacing between CORS stations is thought to be 100-150 km for all Turkey. The most extensive usage of CORS stations will be in urban areas. Furthermore, when keeping in mind the other necessities of CORS stations, like energy,communication...etc., then the selection of station locations will be dependent on the following criteria:

- Must be in province centers;
- Must be in big urban places along borders and coasts;
- Must be on sound foundation (away from landslides); and
- Must have electricity and communication facilities.

In addition to that, the locations of CORS stations must be selected such that monitoring of deformations of plate tectonics is feasible. The main characteristics to be sought in the GPS receivers that will be deployed at CORS stations are:
Must be dual-frequency GPS receiver with choke-ring antenna;

- Must be compatible with GPS, GLONASS and “the coming soon” GALILEO;
- Must be web-based; and
- Must be capable of all kinds of communication (e.g. radio, GSM / GPRS, Thuraya, NTRIP, Internet...etc).

Companies like Leica, Thales, Topcon and Trimble manufacture such systems. The realization of system selection will be done upon objective criteria, such as: technical capability of receiver, manufacturer’s competence and support, price...etc.

A pre-requisite of the CORS software would be its ability to correct for ionospheric, tropospheric, multi-path and orbit effects and facilitate the usage of these corrections for RTK positioning up to 75 km away from terminals. The selected software will be required to enable the implementation of two famous techniques being used worldwide:

- FKP (Flachen Korrectur Parameter) – for linear area correction parameters,
- VRS (Virtual Reference Stations).

These two techniques, all together with many others, will be studied through the project and an optimum solution will be determined for hardware and software selections. The administration of CORS-TR system will be conducted from one center. The entire data of CORS-TR stations will be automatically forwarded to this center, where all CORS Network calculations will be conducted and corrections passed to users. Furthermore, the option of establishing local centers will be assessed, within the scope of project. For the sake of communications, RTCM 3.0 and more advanced protocols will be used, thus radio, GSM, GPRS, NTRIP (Network Transport of RTCM through Internet Protocol) communications will be assured. Within this context, study will be conducted over the nation-wide coverage of GSM (i.e. Turkcell, Telsim, Avea...etc.) to exactly determine its extents, and areas out of GSM coverage will be inspected for Thuraya coverage. All activities of this section are planned to conclude by the end of 2006.

3.6 CORS-TR System Establishment

At first stage, areas thought for CORS-TR stations are roofs of sound public buildings, areas of meteorology stations, and other safeguarded and communicationequipped areas. Upon the conclusion of CORS station constructions, receivers will be setup and installed and CORS-TR will start to serve. As mentioned above, all data will be automatically gathered at one control center, which will provide the services of post-processing, DGPS and RTK to all users. During stage of project initiation, the CORS-TR control center will be established in Istanbul, within ICU, where the system will be brought to full-activity status. Similar centers will be established at GCM and GDLRC. All activities of this section are planned to conclude by the end of March 2007.

3.7 Development Of Datum Transformation Models

Until recently, datum of (Mesedag originated at Ankara) had been used and all geodetic networks, maps and measurements had had been produced in it. The National Geodetic Network (**NGN**: Ulusal Jeodezik Ag - UJA) works were conducted by GCM during the years of 1950-1954, and densification activities took place later on to result in 449,215 points. Due to available low-tech at those days, established NGN had 1/100,000 – 1/50,000 (10-20 ppm) relative precision (i.e. errors of 1-2 m are possible in 100 km baselines). Because the precision of NGN is way behind precision provided by modern technology, GDLRC and GCM established **TNGN** (i.e. TUTGA) during the years of 1997-2001, constituted of 594 points. GCM carried out the necessary computations of TNGN, getting the points' coordinates and velocities in ITRF (i.e. International Terrestrial Reference Frame). The relative precision of the network and the precision of point positions were found to be 0.1-0.01 ppm and 1-3 cm, respectively.

All maps and coordinates produced nation-wide, up to the year 2001, have been in ED50 datum. Only in GDLRC there are more than 300,000 maps produced in ED50 datum. It is a must to transform those products to ITRFyy datum. It is hoped to have transformation precision consistent with map scale in ED50 datum. Keeping in mind the relative precision of NGN and realizing that maps with 1/1,000 scale have precision of around 0.3, it is thought to be necessary to have common points with known coordinates in both ED50 and ITRFyy at around 30-km spacing. In this context, and within the scope of CORS-TR Project, ITRFyy coordinates will be determined for points of ED50 at around 30-km spacing.

To do so, all points measured in ED50 by GCM, GDLRC and other establishments will be inspected and the ones at appropriate locations will be selected and measured in ITRFyy using CORS-TR system. Taking into account the coordinate differences between common points at around 30-km spacing, a nation-wide methodology (e.g. linear regression, minimum curvature surface...etc.) will be adopted and used upon the conclusion of R&D works of project team.

3.8 Research and Development (R&D)

The project, all through its various stages from the beginning to the end, will constitute an open arena for scientific research and development. Such R&D activities will mainly be over these topics:

1. The effects on static and RTK position determination when GLONASS and GALILEO are used in addition to GPS;
2. Modeling of error sources using CORS network concept, analysis of existing models, and development of new models;
3. Determination of atmospheric parameters, within the scope of CORS-TR, and research of their effects on meteorological predictions;
4. Monitoring of deformations in plate tectonics nation-wide, and assessment of this activity within the context of studies to predict earthquakes; and
5. Research and development of models to transit from ED50 datum to ITRFyy datum.

3.9 Project's Contributions and Users

CORS-TR Project will have very important contributions in the fields of civil and scientific applications. Some of these contributions are listed below:

Civil Users

- Geodetic measurements;,
- Map measurements and GIS;
- Planning and environment;
- Monitoring of engineering structures;
- Monitoring of dams;
- Precise navigation and vehicle tracking;
- Infrastructure measurements and project applications ;
- E-government, e-municipality, e-commerce applications; and
- All other geo-information projects.

Scientific Users

- Earthquake engineering;
- Seismology;
- Monitoring and analysis of disturbances in ionosphere and troposphere;
- Meteorology; and
- Smart transportation.

When the project concludes, the contributions of its services to geo-information technologies will be massive. Some of these contributions are listed below:

- It will constitute a foundation for all geo-information technologies, nationwide; map production, cadastre, engineering measurements, infrastructure **measurements,** planning, environment, transportation, e-government, emunicipality, e-commerce...etc.
- Hundreds of users, nation-wide, will work without the necessity of looking for local reference control points, which will tremendously increase the work efficiency; in some developed countries, one stationary base station is used by tens and even hundreds of rover stations, within their national networks.
- A nice example of the impact of this project would be the budget allocated by GDLRC, ILLER Bank, MUNICIPALITIES and other public establishments during the year 2005, in excess of 50 millions US Dollars, for the activities of geodetic networking. When this project is over, great savings in money and time will take place.
- When this project concludes, many high-tech activities like DGPS and Vehicle Tracking will benefit from it. Another important issue: establishments that produce maps of big scales like GDLRC and ILLER Bank will be able to transform their data easily, and great window of opportunity will be opened for the realization of various projects of Geographic Information Systems, Land Information Systems, and Registry & Cadastre Information Systems.

CORS-TR system will be used in projects of planning, infrastructure, municipality, vehicle tracking, agriculture, forestry, GIS/LIS...etc outside GCM and GDLRC. This system will be highly beneficial for measuring Ground Control Points necessary for the operations of photogrammetric map production, ortho-rectification, ortho-photo production...etc.

CORS-TR Project has significant implications for GDLRC:

- GDLRC will guarantee great savings in time and cost regarding its geodetic activities. For instance, the budget allocated for the year 2005 for such activities was around 20 millions US Dollars, the majority of which would have been saved had this system been ready.
- GDLRC will be able to conduct its cadastral works in a much better fashion, with higher quality, less cost and faster execution speeds.
- GDLRC will be able to acquire the necessary information for TAKBIS to conduct coordinate transformation, and to gather new data.

CONCLUSIONS

Maps, map information and land tenure information such as ownership, restriction and usage rights have great importance in societies. GDLRC is the fundamental institution especially big scale maps and ownership rights. It has initiated big projects recent years. One of these projects is Map Production Following Center Project under Land Registry and Cadastre Information System that is a big GIS project to follow the map related metadata named as catalog services. MPFCP is now under construction, but it is expected MPFCP is a information infrastrucure project for e-government and Spatial Data Infrastrucure. This project aims to provide infrastructure information for National Geographic Information System Project in Turkey.

CORS-TR Project, to be realized through the partnership of ICU, GCM, and GDLRC, is highly relevant to all public and private establishments and individuals who deal with geographic data. That is why, and since the starting point of the project, relevant info, idea, and recommendations of our colleagues are highly appreciated. Through the period of the project three assemblies will be held, the first of which was on May 15, 2006 at ICU's Ataköy Campus.

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BIOGRAPHICAL NOTES

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